DOCUMENT RESUME

ED 289 872 SP 029 792

AUTHOR Evans, Blanche W.; Williams, Hilda L.
TITLE Aerobic Exercise Prescription for Rheumatoid Arthritics.
PUB DATE [85]
NOTE 20p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Aerobics; *Exercise Physiology; Life Style; Physical Activities; Physical Health; *Program Effectiveness; *Therapy
IDENTIFIERS *Rheumatoid Arthritis

ABSTRACT

The use of exercise as a general treatment for rheumatoid arthritics (RA) has included range of motion, muscular strength, water exercise and rest therapy while virtually ignoring possible benefits of aerobic exercise. The purposes of this project were to examine the guidelines for exercise prescription in relation to this special population and to determine the effects of a 12-week progressive, interval-type cycling program on physiological variables as well as perceived lifestyle changes in a small sample (n=4) of RA. Measures of physical work capacity (PWC), ratings of perceived exertion (RPE), blood pressure (BP), and flexibility were completed prior to and at completion of the exercise program. In addition, questionnaires concerning medical history and lifestyle were completed. After 12 weeks of internal cycling, significant improvements were noted. Blood pressure decreased substantially during work and RPE was lower. Changes in flexibility at the hip, knee and ankle were minimal. Lifestyle benefits included reduction in fatigue, less pain throughout the day, and a reduction in daily pain medication. In conclusion, the results from this small sample of RA suggests the possible benefits of land cycling for RA and the ability of this group of individuals to withstand the rigors of such a program. However, some additional questions regarding appropriate exercise testing and prescription for RA indicate the need for further research. (Author/JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED289872

Aerobic Exercise Prescription for Rheumatoid Arthritics

Blanche W. Evans and Hilda L. Williams

Bell Center

Drake University

Des Moines, Iowa 50311

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

B. W. Evans

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SP 029 792

ABSTRACT

The use of exercise as a general treatment for rheumatoid arthritics (RA) has included range of motion, muscular strength, water exercise and rest therapy while virtually ignoring possible benefits of aerobic exercise. The purposes of this project were to examine the guidelines for exercise prescription in relation to this special population and to determine the effects of a twelve week progressive, interval-type cycling program on physiological variables as well as perceived lifestyle changes in a small sample (n=4) of RA. Measures of physical work capacity (PWC), ratings of perceived exertion (RPE), blood pressure (BP), and flexibility were completed prior to and at completion of the exercise program. In addition, questionnaires concerning medical history and lifestyle were completed. After twelve weeks of interval cycling, subjects improved PWC max by 10%, cycle test time by 74%, HR at max pain by 22% (114 to 130), and work (kpm) at max pain by 97.8%. In addition, BP decreased substantially during work and RPE was lower at posttest compared to pretest values. Changes in flexibility at the hip, knee and ankle were minimal. Lifestyle benefits included a reduction in fatigue, less pain throughout the day, and a reduction in daily pain medication. In conclusion, the results from this small sample of RA suggests the possible benefits of land cycling for RA and the ability of this group of individuals to withstand the rigors of such a program. However, some additional questions regarding appropriate exercise testing and prescription for RA indicate the need for further research.

INTRODUCTION

Rheumatoid arthritis is a progressive degenerative disease with complications that include nerve, muscle, joint and organ involvement. Often rheumatoid arthritis leads to permanent joint deformity and generally involves loss of range of motion and pain. Whether pain induced or psychologically induced, rheumatoid arthritics (RA) tend to lead a sedentary lifestyle. Previous researchers (Ekblom et al., 1974, 1975a; Beals et al.,1981; Harkom et al., 1983; McMaster et al., 1984) have shown individuals with RA have lower physical work capacity (PWC), VO_2 max and ventilatory efficiency than sedentary non-disabled individuals. In addition, a reduced ability to perform daily tasks, an inability to complete a full work day and general fatigue appear to negatively affect self-concept, decrease desire for social interactions and increase fear of participation in RA (Bar-Or, 1983).

Traditional therapy has centered on rest therapy (Smith & Polley, 1978) and on maintaining basic range of motion, muscular strength and daily living skills (Shephard, 1978; Bar-Or, 1983) with little encouragement given to participation in other types of physical activities. While the benefits of regularly performed aerobic exercise are well-known for non-disabled individuals (Pollock, 1973), the role of this type of activity in producing positive physiological and psychological changes in individuals with RA has just recently been examined.

The beneficial effects of aerobic exercise programs on individuals with RA have been examined by several investigators during short-term and long-term programs. During short-term exercise of five to twelve weeks, a significant improvement was found in PWC and VO_2 max (Ekblom et al., 1974, 1975a; Nordemar et al., 1975a; Beals et al., 1981; Harkom et al., 1983). Other benefits noted as a result of the short-term programs included less morning stiffness and

swelling, decreased ratings of perceived exertion (RPE) for exercise and daily tasks, and increased social activities. In addition joint counts were not adversely affected.

The benefits derived from continued participation in some type of physical activity have been reported in a six month follow-up study by Ekblom et al. (1975b) and in seven month follow-up studies by Nordemar et al. (1976b, 1981). Those investigators found that participation in any physical activity resulted in decreased general fatigue, decreased muscle atrophy, and increased socialization. In addition, long-term participation improved joint status and showed no progress of cartilage destruction and no new change in bone structure. Individuals continuing exercise utilized less sick leave time and required less sick leave pension when compared with those individuals not continuing exercise. Continued improvement in PWC and related physiological variables was not found (Ekblom et al., 1975a).

Though positive benefits of participation in short term exercise programs have been cited, several weaknesses in these studies should be noted. Several studies indicated that maximal test values were elicited at the pretest, but the reported values did not support known criteria of maximal effort including age-estimated heart rate (HR) data, RPE at maximal work of 15, lack of plateau of VO_2 values,and low blood lactate values. Several of the studies did not provide supervised and individually prescribed exercise after a short-term project nor did they offer an exercise location for participation. In the long-term studies, subjects changed exercise mode. None of the follow-up studies controlled for exercise intensity. In many of these studies the participants did not improve beyond the initial program posttest values. One possible explanation for the inconsistency of values found in previous studies is that special populations such as RA may require a modified testing protocol.

Current guidelines for exercise testing and prescription need careful examination as to their appropriateness for special populations.

In summary, the general treatment of individuals with rheumatoid arthritis have included non-aerobic activity such as range of motion, muscular strength and rest therapies. Though the use of aerobic exercise for treatment in a variety of chronic diseases (coronary artery disease, diabetes, obesity, pulmonary disease) is well recognized by medical specialists, therapists, and physical educators, such exercise regimens for individuals with rheumatoid arthritis have been virtually ignored. Though exercise may not alter the pathology of the disease, the possible positive benefits from a lifestyle change are critical to this population.

PURPOSE

The purposes of this project were to examine the guidelines for exercise prescription in relation to this special population and to determine the effects of a progressive, interval-type cycling program on physiological variables and perceived lifestyle changes in a small sample of RA. An additional purpose was to determine the ability of RA to withstand the rigors of a systematic aerobic exercise program.

PROCEDURES

Subjects

Four subjects volunteered for the program, but one had to drop-out due to complications with the disease (unrelated to the exercise program) during the second week. Two females (ages 52 and 64) and one male (age 58) completed pretests, a twelve week cycling program and posttests.

Tests

Physical Work Capacity Test. A multi-stage, continuous cycle ergometer test was used to assess PWC and estimate maximal oxygen uptake. Each stage was three minutes with increases of 25 watts between stages. Pedal rate was set by an electric metronome at 50 rpm. The subjects continued to pedal until maximal volitional fatigue as indicated by a 19 or 20 on the Borg RPE Scale or as indicated by maximal perceived pain tolerance. During the test session, electrocardiogram response was monitored continuously and HR determined from ECG recordings. Blood pressure was recorded every third minute throughout the test using an anaeroid sphygmomanometer. HR and RPE were recorded at the end of each minute of exercise.

Body Composition Assessment. Skinfold measures were taken at selected body sites specific to the age and sex of the subject (Pollock et al., 1983). Three independent readings were obtained at each site using Lange skinfold calipers.

Range of Motion. Range of motion at the hip, knee, and ankle joints were measured using a Leighton flexometer. Each subject performed three trials at each joint. All trials were recorded in degrees and the mean of the closest trials was used for this test.

Activities and Lifestyle Index. A self-administered functional assessment questionnaire was completed by each subject at the beginning of the program and repeated at the posttest.

Prescription

Exercise intensity was prescribed as a percentage of initial PWC and by RPE. Exercise prescription by HR was not possible as subjects were physically unable, due to fatigue and pain, to perform work that would elevate HR to a 60% to 75% max level. Initial prescriptions based on PWC had to be modified

(reduced) because of subjects' reports of joint discomfort and their inability to complete the workout. Thereafter, workloads were adjusted every two weeks throughout the program and no adverse effects were noted as a result of the progressive resistance exercise. The exercise prescriptions for each subject for work rate and HR are presented for week one in Figures 1a and 1b. In addition, the actual workrate completed for both work and rest intervals are presented in Figure 1a. Figure 1b includes HR at max pain and the actual HR attained during week one of the exercise program.

Conditioning Program

Subjects exercised three days per week for twelve weeks on a Monark cycle ergometer. Workouts included a warm-up, 20-30 minutes of interval cycling, and a cool down. The average workrate maintained by each subject for each week of the program is presented in Figure 2.

RESULTS

Results of the study indicate that subjects improved PWC max by 10%, cycle test time by 74%, HR at max pain by 22% (114 to 130), and work (kpm) at max pain by 97.8%. In addition, BP decreased substantially during work and RPE was lower at posttest compared to pretest values. Changes in flexibility at the hip, knee and ankle were minimal. Lifestyle benefits included a reported reduction in fatigue, less pain throughout the day, and a reduction in daily pain medication. Group and individual changes in physiological measures which occurred as a result of the program are shown in Figures 3 and 4, respectively. In addition, each subject's RPE response to the pretest and posttest are shown in Figure 5: S1, S2, S3.

CONCLUSIONS

The results from this small sample suggest that RA can benefit from land cycling and that this group of individuals can withstand the rigors of such a program. Therefore, land cycling appears to be a viable exercise alternative. However, some additional questions regarding appropriate exercise testing and prescription for RA indicate the need for further research. It is important to continue to examine current exercise guidelines with special populations to ensure a safe and progressive exercise program that provides the needed benefits to its participants.

SUMMARY AND RECOMMENDATIONS

1. The participants in the study were highly motivated and interested in the program and willing to tolerate the pain encountered during exercise.
2. The adherence to the program was excellent. Compliance was difficult to achieve due to pain encountered during cycling and the fact that two of the subjects were unfamiliar with exercise stress and the fatigue associated with workouts.
3. Exercise prescription was made difficult throughout the program because subject response to the prescribed workload was unpredictable. However, these subjects tended to exercise at a level just below the onset of perceived intolerable pain.
4. The subjects in this study perceived RPE differently from pain.
5. Maximum test values are difficult to achieve as intolerance to pain appears to occur prior to fatigue.
6. The following recommendations are based on work with this small sample of RA:

A. Exercise prescriptions based on HR (Karvonen formula) or normal percentages of PWC should be re-examined for this population.

B. Future studies should examine the use of RPE and some type of pain scale to prescribe and regulate exercise intensity.

C. The values associated with perceived level of maximal pain may be useful in assessing change in this population.

REFERENCES

1. Bar-Or O: Pediatric Sports Medicine for the Practitioner. New York, Springer-Verlag, 1983.

2. Beals CA, Lampman RM, Figley BA, et al: The oxygen cost of work in rheumatoid arthritics patients. Clinical Res 1980; 28: 752.

3. Beals CA, Lampman RM, Figley, BA, et al: A case for aerobic conditioning exercise in rheumatoid arthritis. Clinical Res 1981; 29 (4): 780.

4. Borg, G: Physical Performance and Perceived Exertion. Sweden, Gleerup, Lund, 1962.

5. Ekblom B, Lovgren O, Alderin M, et al: Physical performance in patients with rheumatoid arthritis. ScandJ Rheumatology 1974; 3: 121-125.

6. Ekblom B, Lovgren O, Alderin M, et al: Effect of short-term physical training on patients with rheumatoid arthritis I. Scand Journal Rheumatology 1975a; 4: 80-86.

7. Ekblom B, Lovgren O, Alderin M, et al: (1975b). Effect of short-term physical training on patients with rheumatoid arthritis: A six-month follow-up study. Scand J Rheumatology 1975a; 4: 87-91.

8. Harkom PM, Lampman RM, Banwell BF, and Castor CW: Therapeutic value of graded aerobic exercise training in rheumatoid arthritis. Arthritis and Rheumatism 1985; 28: 32-39.

9. Leighton JR: The Leighton flexometer and flexibility test. J Assoc Physical Ment Rehabil 1966; 20: 86-93.

10. McMaster WC, Caiozzo VJ, Davis JA, et al: Aerobic capacity of elderly arthritic patients. Med Sci Sports Exerc 1984; 16(2): 133.

11. Nordemar R, Edstrom L, Ekblom B: (1976a). Changes in muscle fiber size and physical performance in patients with rheumatoid arthritis after short-term physical training. Scand J Rheumatology 1976a; 5: 70-76.

12. Nordemar R, Berg U, Ekblom B, Edstrom L: Changes in muscle fiber size and physical performance in patients with rheumatoid arthritis after seven months physical training Scand J Rheumatology 1976a; 5: 233-248.

13. Nordemar R, Ekblom B, Zachrisson L, Lundquist K: Physical training in rheumatoid arthritis: A controlled long-term study. Scand J Rheumatology 1981; 10: 17-23.

14. Pollock ML: The quantification of endurance training programs, in Wilmore JH (ed): Exercise and Sport Sciences Review: New York, Academic Press, 1973; I: 155-188.

15. Pollock ML, Wilmore JH, Fox SM: Exercise in Health and Disease: Evaluation and Prescription for Prevention and Rehabilitation. Philadelphia, WB Saunders, 1984.

16. Smith RD, Polley HF: Rest therapy for rheumatoid arthritis. Mayo Clinic Procedures 1978; 53: 141.

17. Shephard RJ: Physical Activity and Aging. Chicago, Year Book Medical Publishers, 1978.

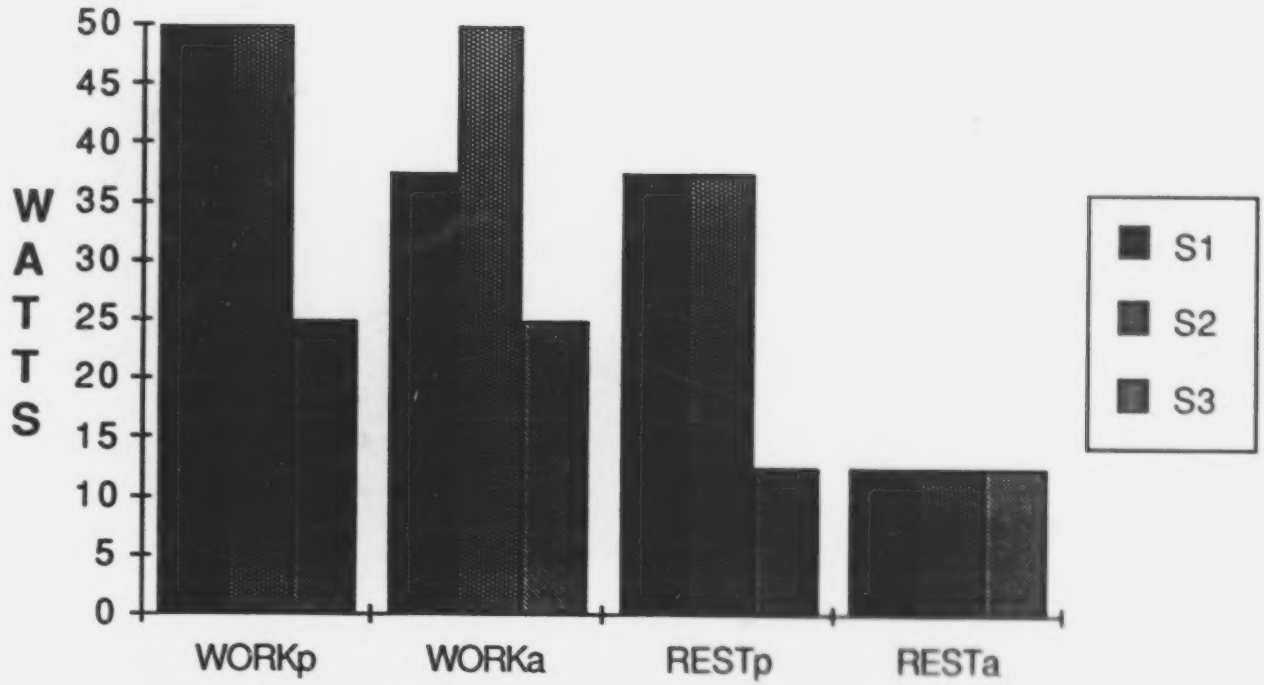


Figure 1a. The work rate prescribed (WORKp) for each subject for week one of exercise, the work rate actually completed (WORKa) during week one of exercise, the work rate prescribed for the rest intervals (RESTp) and the work rate actually completed during the rest intervals (RESTa) during week one of the exercise program.

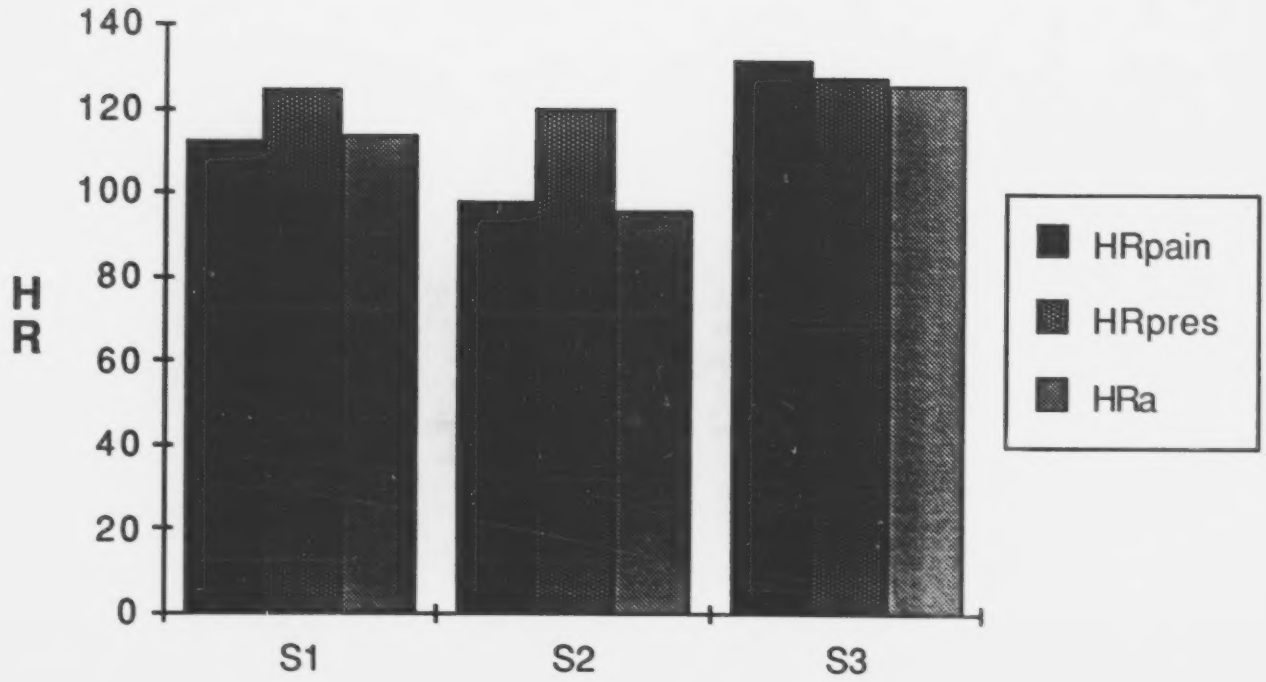


Figure 1b. Heart rate at max pain, heart rate prescribed for the first week of exercise, and heart rate actually attained during the first week of exercise for each subject.

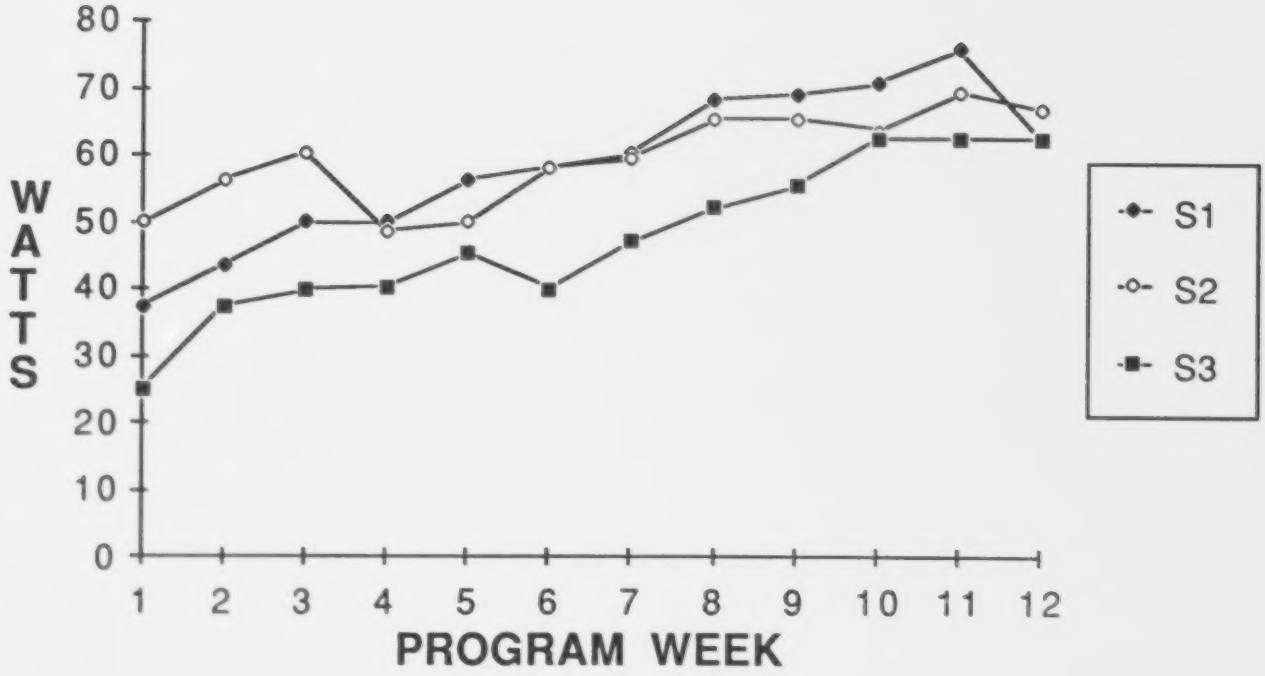


Figure 2. The average work rate completed by each subject for each week of the program.

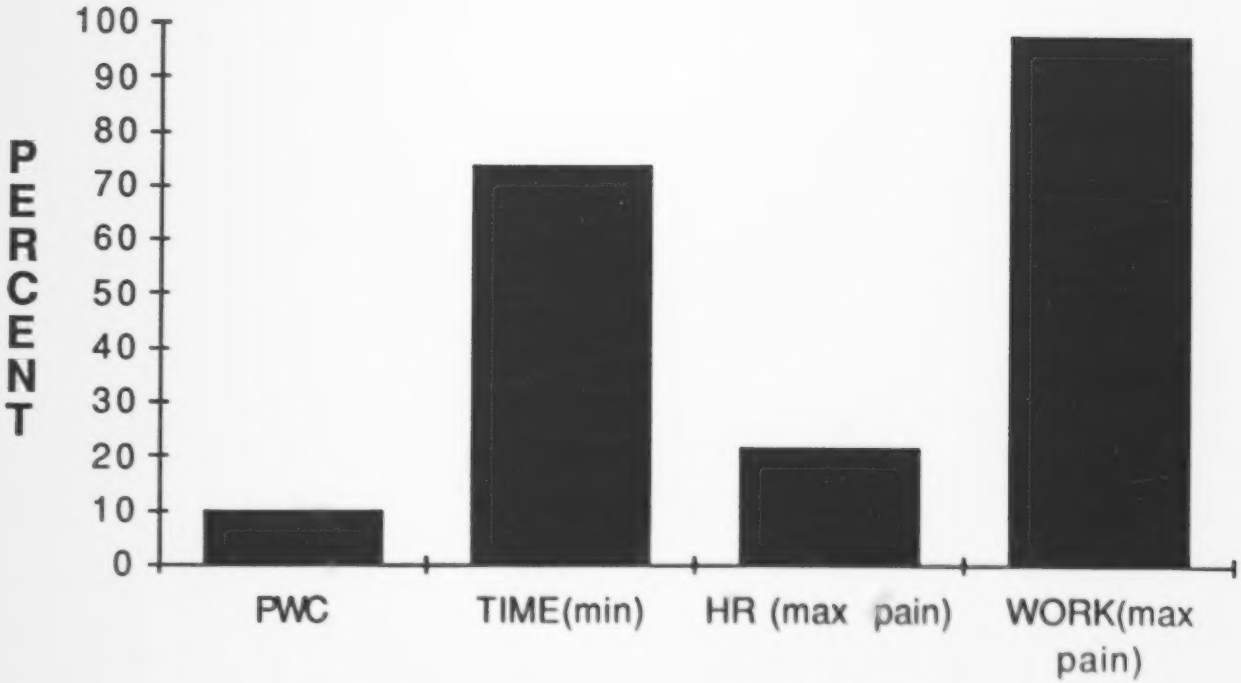


Figure 3. Percent change in performance variables of the group for the twelve week program.

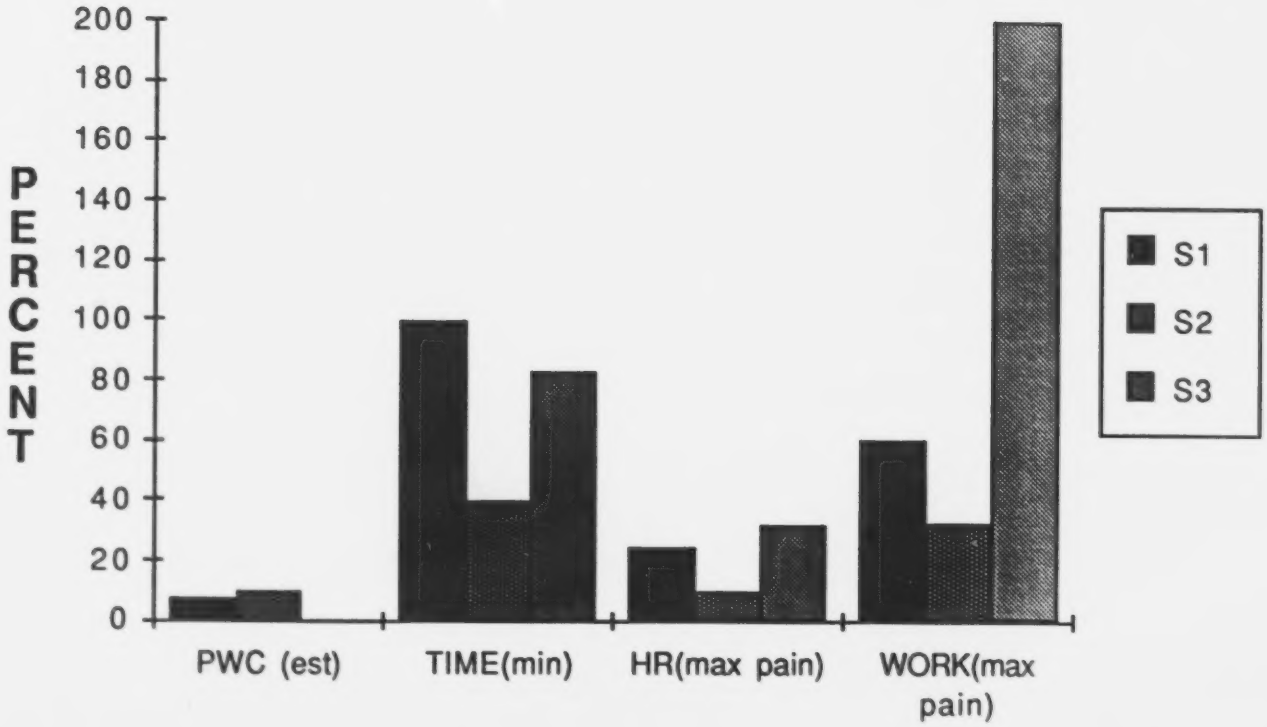


Figure 4. Percent change in performance variables for each subject for the twelve week program.

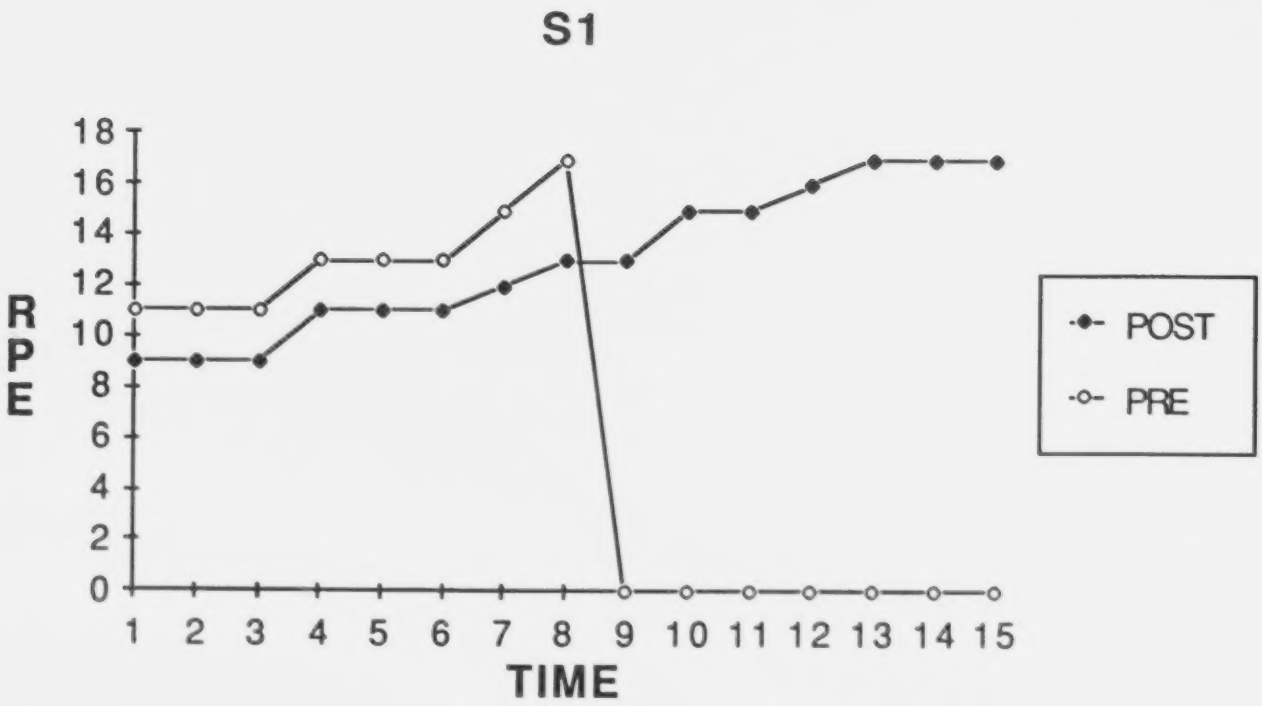
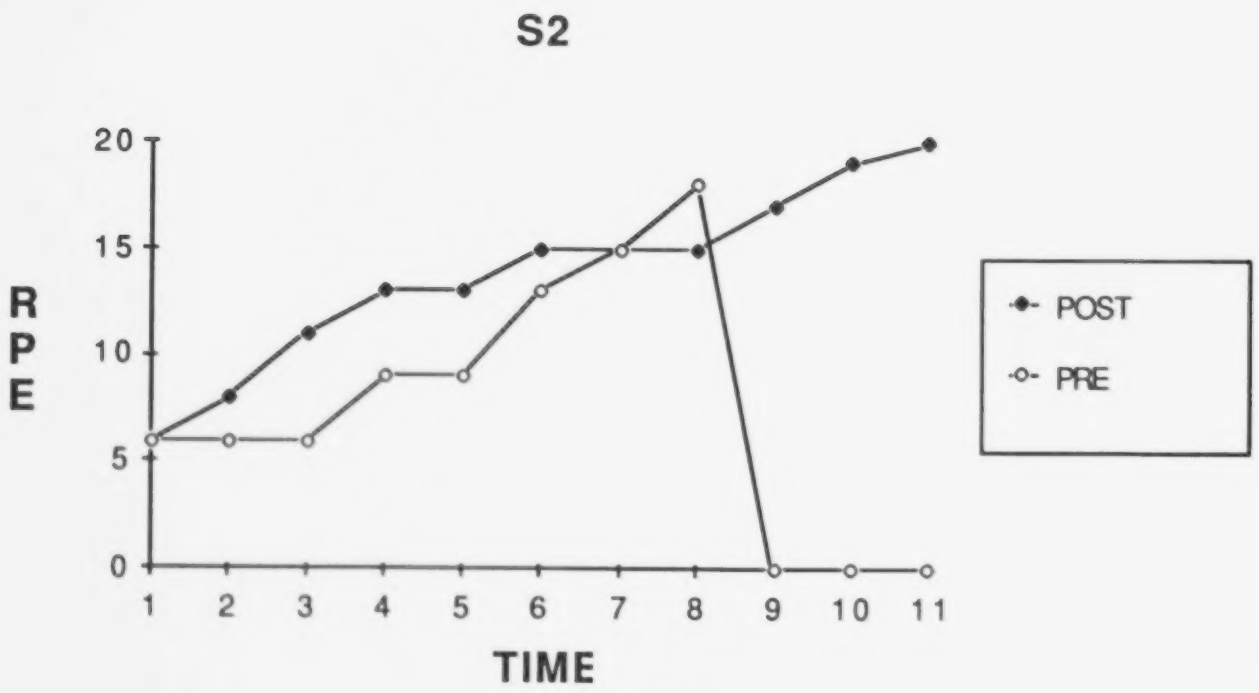
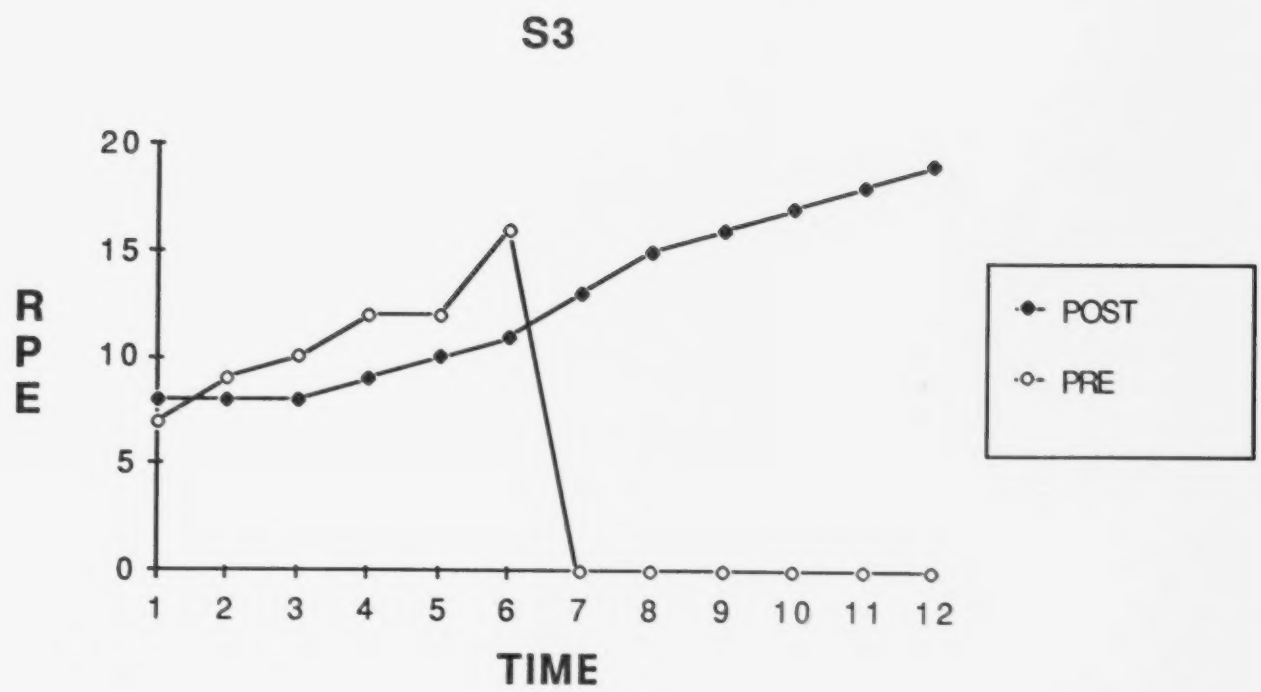


Figure 5. Ratings of perceived exertion for cycle ergometer pretest and posttest for each subject S1, S2, and S3.


S2
20
15
10
5
0
RPE
1
2
3
4
5
6
7
8
9
10
11
TIME
POST
PRE


S3
20
15
10
5
0
RPE
1
2
3
4
5
6
7
8
9
10
11
12
TIME
POST
PRE